CTD4022

CT4022 Evaluation Board User Guide

DESCRIPTION

The CT4022 is a highly linear, XtremeSense™ TMR-based current sensor. The tunneling-magnetoresistance (TMR) sensor is differential, which enables common-mode field rejection to cancel out stray magnetic fields. The primary conductor is only 0.5 mΩ, which enables the sensor to withstand high inrush current and to minimize power loss. The current applied to the pin of the primary conductor generates an internal differential magnetic field. The TMR sensor provides a proportional voltage to the differential magnetic field and simultaneously rejects common-mode stray magnetic fields. The pins of the primary conductive path and the sensor leads are galvanically isolated. This enables high-side current sensing without the need for additional isolation techniques.

FEATURES

- Optimized for high dV/dt applications
- 500 kHz bandwidth
- Common-mode field rejection
- 0.5 mΩ primary conductor resistance
- Ratiometric output from supply voltage

EVALUATION BOARD CONTENTS

- CT4022 evaluation board

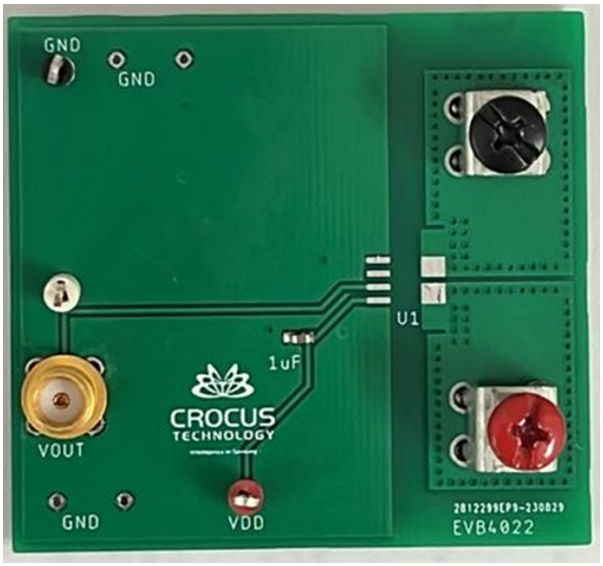

Figure 1: CT4022 Evaluation Board

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Table 1: CT4022 Evaluation Board Configurations

Configuration Name	Part Number
CT4022-20AC Evaluation Board	CT4022-H20BSN8
CT4022-50AC Evaluation Board	CT4022-H50BSN8

Table 2: General Specifications

Specification	Min	Typ	Max	Units
Supply Voltage Range	3	3.3 or 5	5	V
Supply Current Range	–65	–	65	A
Input Operating Temperature	–40	–	125	ºC
CT4022-H20BSN8 Variant				
Input Operating Current	–20	–	20	A
CT4022-H50BSN8 Variant				
Input Operating Current	–50	–	50	A

USING THE EVALUATION BOARD

Introduction

This section provides an overview of the connections and configuration options of the CTD4022 evaluation board. The proper configuration is shown in Figure 2 and is detailed in the sections that follow. Detailed information about the use and functionality of each pin and detailed specifications about the sensor are provided in the CT4022 datasheet. For more detailed information than is contained in this user guide, refer to the CT4022 datasheet.

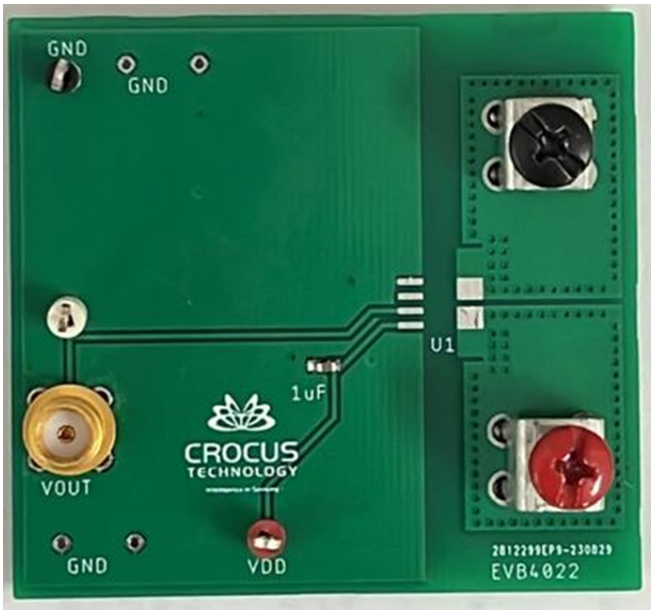

Figure 2: EVB4022 Evaluation Board

Power Input and Board Configuration

Connect a current supply to the two terminal screws and ensure that the current does not exceed 65 A or reduce to less than –65 A. Attach a voltage source to VDD and GND that does not exceed 6 V (typically 3.3 V or 5 V). Attach an SMA connector to VOUT to read the output voltage based on the input current.

The sensor provides a continuous linear analog output voltage that represents the current measurement. The output voltage range of OUT is from 10% VCC to 90% VCC with a VOQ of 10% of VCC and 50% of VCC for unidirectional and bidirectional currents, respectively.

Power-On Time

Power-on time of 200 µs is the amount of time required by CT4022 to start up, fully power the chip, and becoming fully operational from the moment the supply voltage is applied. This time includes the ramp-up time and the settling time (within 10% of steady-state voltage under an applied magnetic field) after the power supply has reached the minimum VCC.

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SCHEMATIC

The schematic of the CT4022 evaluation board is shown in Figure 3.

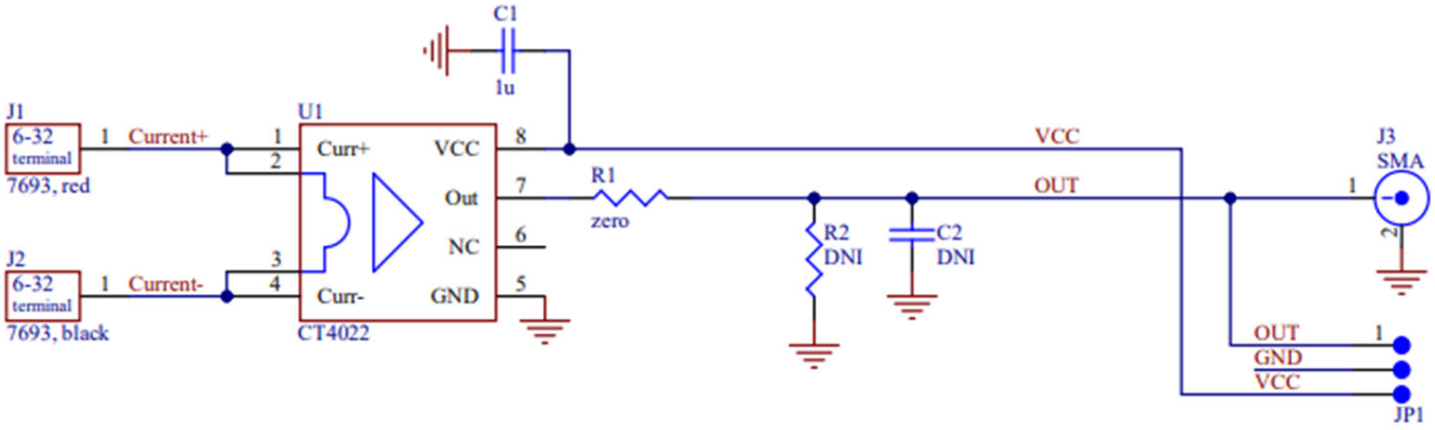

Figure 3: CT4022 Evaluation Board Schematic

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LAYOUT

The top and bottom layers of the CT4022 evaluation board are shown in Figure 4 and Figure 5, respectively.

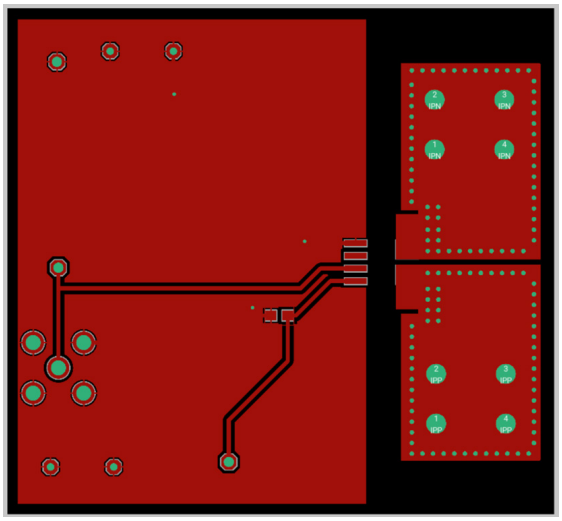

Figure 4: Top Layer

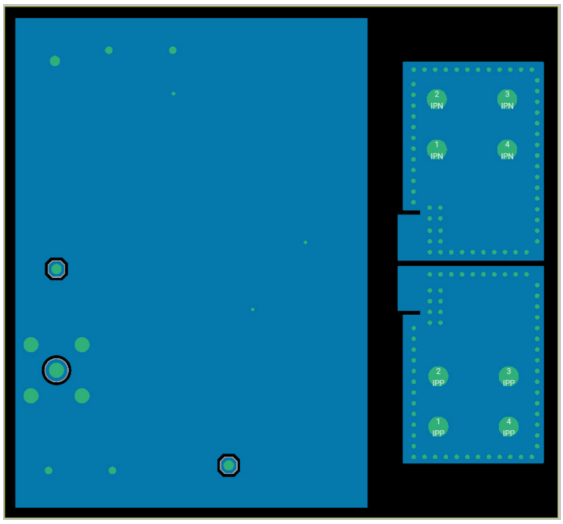

Figure 5: Bottom Layer

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BILL OF MATERIALS

Table 3: Evaluation Board Bill of Materials

ELECTRICAL COMPONENTS				
Designator	**Quantity**	**Description**	**Manufacturer**	**Manufacturer Part Number**
PCB	1	CTD4022 evaluation board	Allegro MicroSystems	–
U$2	1	CT4022 sensor	Allegro MicroSystems	–
JP3	3	Male header connectors	Wurth Elektronik	61300111121
C1	1	Capacitor, ceramic, 1 µF, 25 V, 10% X7R 4803	TDK	MSAST168SB7105KTNA01
VOUT	1	SMA connector	Samtec	SAM8971-ND
C1	1	Capacitor, ceramic, 1 µF, 25 V, 10% X7R 0603	TDK	MSAST168SB7105KTNA01
–	2	Connector heads	TE Connectivity	225693-E225693-E
–	2	M3 × 6 mm metal screws for connector heads	UXCell	a15120300ux0251

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RELATED LINKS

CT4022 product page:

https://www.allegromicro.com/en/products/sense/current-sensor-ics/sip-package-zero-to-thousand-amp-sensor-ics/ct4022

APPLICATION SUPPORT

For samples or applications support contact, visit https://www.allegromicro.com/en/about-allegro/contact-us/technical-assistance and navigate to the appropriate region.

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Revision History

Number	Date	Description
–	November 13, 2024	Initial release

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